## REMARKS

Applicant has received and reviewed the Office Action dated October 2, 2001. By way of response, Applicant has amended claims 1, 11 and 12 and added new claims 17-19. Additionally, Applicant has amended claims 5, 8 and 10 to correct grammatically incorrect language that resulted from an incomplete removal of multiple dependencies in a previous Preliminary Amendment. Claims 1-14 and 17-19 are pending. No new matter is introduced. Applicant submits that the amended and newly presented claims are supported by the specification.

### Rejection of Claims Under § 112, Second Paragraph

The Examiner rejected claims 1-10 under 35 U.S.C. § 112, second paragraph for insufficient antecedent basis for the recited limitation "the recirculating stream." In response, Applicant has amended claim 1 to recite "a recirculating stream," thereby removing any suggestion of antecedent basis. Accordingly, it is believed that the amended and newly presented claims fully comply with § 112, second paragraph. Withdrawal of this rejection is respectfully requested.

### Rejection Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-4 and 8-14 under 35 U.S.C. § 103(a) as being obvious over Hudson (U.S. Patent 5,013,415) in view of Davies (U.S. Patent 4,917,782). Applicant respectfully traverses this rejection. However, to further prosecution of the application, and not to acquiesce to the rejection, claims 1, 11 and 12 have been amended to clarify the role of the electrolytic cell of the invention. Support for this clarifying amendment can be found in the specification at least at pages 5, 8 and 9.

*Graham v. John Deere Co.* delineates the factual inquiries for a proper determination of obviousness. These include: 1) the scope and contents of the prior art; 2) the differences between the prior art and the claims at issue; 3) the level of ordinary skill in the art; and 4) if applicable, secondary considerations. *See Graham*, 383 U.S. 1 (1966).

Under the second Graham consideration, the cited references must be considered as a whole and must suggest the desirability of making the combination. MPEP § 2141. In addition, according to the MPEP, "a prior art reference must be considered in its entirety. . . including portions that would lead away from the claimed invention." MPEP § 2141.02 (citing *W.L. Gore*

*& Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540 (Fed. Cir. 1983) cert. denied, 469 U.S. 851 (1984)). Applicant asserts Hudson in view of Davies does not teach all of the claimed limitations. Furthermore, as discussed below, the Davies reference actually leads away from the claimed invention.

Hudson describes a process in which recirculating water is pumped through a coarse and fine filter, ionization cells and catalytic water converter. Col. 1, lines 47-50. In Hudson, the ionization cell provides $Ag^{+}$ and $Cu^{2+}$ non-oxidizing biocide ions. Col. 5, lines 12-19. This ionization cell can neither decompose water nor generate chlorine, as in the presently claimed invention. Further, Hudson does not provide parameters for treating heavy chemical oxygen demand (COD) polluted water, which is a non-obvious advantage of the claimed invention. Although in operation, the Hudson system may be efficient for cooling towers using a medium range of COD polluted water, it does not relate whatsoever to the biomass problem associated with heavy COD polluted water.

In addition, the order of the steps described in the process of present application is quite different from that disclosed in the Hudson reference. For example, claim 7 of Hudson sets forth a method of treating water comprising pumping a contaminated liquid through a coarse filter, diverting a portion to a drain while simultaneously discharging a portion to a fine filter, discharging the liquid filtered by the fine filter to an ionizing means, discharging the liquid filtered by the ionizing means through a catalytic converter and discharging the converter treated water to an outlet port. In contrast, claim 1 of the application recites a method comprising feeding contaminated water to a cooling tower, diverting a side stream is from a recirculating stream to an electrolytic cell which removes the solids, decomposes water and generates chlorine, and remixing the treated side stream with the main stream and feeding the combined stream to a cooling tower. As the Examiner can readily appreciate, although both the invention and Hudson divide the stream of contaminated water, Hudson diverts a portion *to a drain*, whereas the present invention rejoins the treated stream to the main stream before sending it to a cooling tower. As stated in the specification at least at pages 3-4, this provides at least two advantages over the prior art: 1) less expensive water can be exploited for the operation of a cooling tower; and 2) industrial and urban waste is reduced.

Davies does not add anything to the Hudson disclosure to make the presently claimed invention obvious to one of skill in the art. Davies states "the process and apparatus not intended

primarily for use in treating badly polluted water, or for treating large quantities of water . . . such apparatus is intended for use in finish clarification of water by an end user of such water or liquid." Col. 2, lines 45-52. This statement in Davies would lead one of skill in the art away from the present application, which deals with a process capable of treating heavy chemical oxygen demand (COD) polluted water. Furthermore, the electrolytic apparatus of Davies is used for "removing impurities of different types such as chemical impurities, including chlorine, metals and alkaline material." Col. 1, lines 29-32. More specifically, the electrolytic apparatus of Davies appears to physically adsorb electrically charged particles on the surface of the electrodes. Col. 4, lines 45-51. There is no teaching that chemical oxidation/reduction reactions are involved in this adsorption process. On the other hand, the present application describes the use of an electrolytic cell which performs chemical oxidation/reduction reactions (transfer of electrons between the electrode and the ions in the water) in which water is decomposed and chlorine is produced. In the Davies apparatus, chlorine is removed from the water (col. 4, lines 55), whereas in the present application chlorine is generated. This, too, would lead the skilled artisan away from the presently claimed invention.

In summary, neither Hudson nor Davies teach flowing contaminated water through an electrolytic cell which performs oxidation/reduction reactions to decompose water, generate chlorine and precipitate solids. Neither reference, alone or in combination, teaches the stepwise method of the invention. Neither reference teaches an invention for the purification of heavy COD polluted water. In light of these deficiencies in the cited references, one of skill in the art would not find the claimed invention as a whole obvious and would in fact be led away from the invention of the application. Accordingly, based on the foregoing differences, it is respectfully submitted that the combination of the Hudson and Davies references applied by the Examiner does not teach the presently claimed invention, and withdrawal of this rejection is respectfully requested.

**Allowable Subject Matter**

Applicant thanks Examiner for indicating in the Office Action that claims 5-7 would be allowable if rewritten to over the rejections under 35 U.S.C. § 112, second paragraph, and to include all of the limitations of the base claim and any intervening claims. As discussed above, the claims have been amended to comply with 35 U.S.C. § 112, second paragraph. New claims

17-19 recite the subject matter of claims 5-7 and all the limitations of the base claim and are therefore allowable. Notification to this effect is earnestly solicited.

## CONCLUSION

In conclusion, each of claims 1-14 and 17-19 are in condition for allowance. The Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below, if the Examiner believes that doing so will expedite prosecution of this patent application.

Respectfully submitted,

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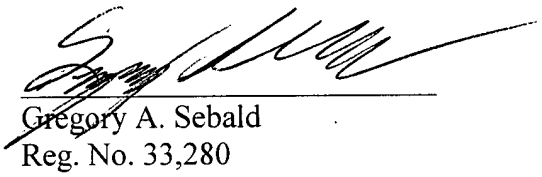
Dated: 1/2/2



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## Version with Markings to Show Changes Made

Claims 1, 5, 8, 10-12 were amended as follows.

1. (AMENDED) A method of operating a cooling tower, comprising feeding to said cooling tower a make-up stream of water containing organic and/or biological contaminants, causing a side stream taken from [the]a recirculating stream to pass through an electrolytic cell that performs oxidation/reduction reactions using DC electrical current for decomposing water and generating chlorine, removing solids [precipitating] precipitated by the action of said cell, and remixing said treated side stream with the main stream, before feeding them to [the]said cooling tower.

5. (TWICE AMENDED) A method according to [any one of] claim[s] 1, further comprising adding a non-oxidizing biocide to the re-circulating stream as an aid in the prevention of biofouling.

8. (TWICE AMENDED) A method according to [any one of] claim[s] 1, wherein the COD of the make-up stream is between about 500 and over 2,000 ppm.

10. (TWICE AMENDED) A method according to [any one of] claim[s] 1, wherein the Redox potential of the stream entering the cooling tower is in the range 300 – 400 mV.

11. (AMENDED) A [C]cooling tower system comprising, in combination with suitable inlets and outlets:

- a cooling tower;
- a heat exchanger;
- an electrolytic cell that performs oxidation/reduction reactions using DC electrical current for decomposing water and generating chlorine; and
- at least one filter.

12. (AMENDED) A method for concentrating waste water, comprising feeding said waste water to a cooling tower, causing a side stream taken from the re-circulating stream to

pass through an electrolytic cell that performs oxidation/reduction reactions using DC electrical current for decomposing water and generating chlorine, removing solids [precipitating] precipitated by the action of said cell, and remixing said treated side stream with the main stream, before feeding them to the cooling tower.

Claims 17-19 are new.